A Cadaveric Study: The Relationship between Sternum and Internal Thoracic Artery

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ABSTRACT

Introduction: Internal thoracic artery is an artery which frequently used in coronary bypass operations. Morphological features such as the location, length, and separation point of the branches are important crucially.

Materials and Methods: The measurements were made in 11 thorax dissections and morphological data of ITA were obtained and photographed. At each sternebra level, a midpoint was determined. The line created by combining these points was called the paramedian line. The distance between the artery and this line in the 2-5 intercostal space was measured. The distance of the artery and the lateral margin of sternum from the was measured at 2-5 intercostal spaces. The length of artery and the branching point was recorded also.

Results: The length of the right internal thoracic artery (between 2-5. intercostal space) is 117.07 mm. The left one is 118.63 mm. Maximum length for the right and left ITA 135 mm and 135.5 mm, respectively. The distance between paramedian line and bifurcatio of right ITA 31.06 mm and left ITA 32.32 mm. Maximum distance between paramedian line and bifurcatio of right ITA is 42.45 mm and the left one is 53.8 mm.

Discussion: ITA is commonly used artery for coronary revascularization. When left anterior descending artery is anastomosed with ITA, survival rate has been found 10% for ten years. However, there are some disadvantages. As a result of pleurotomy, it can/could be seen several complications: parenchymal trauma, pleural effusion, atelectasis and pulmonary complication. Its is crucial to preservation of pleural integrity during dissection to reach ITA. Thus, it is supplied respiratory mechanisms and minimized lung injury.

Conclusion: Internal thoracic artery has a great importance in coronary revascularization. In this study, it is aimed to investigate relationship between sternum and internal thoracic artery.

KEY WORDS

mammary arteries, sternum, coronary bypass

INTRODUCTION

Internal thoracic artery (ITA), emerges from first part of the subclavian artery which goes toward inferiorty on both sides of the sternum, in the opposite direction of thyrocervical trunk. The subclavian artery gives the ITA branch above the sternal end of clavicle. It is located in front of the brachiocephalic vein and on the right side, decussated with phrenic nerve. ITA gives perforating branches to the skin of upper six intercostal space which goes with cutaneous branches of the anterior intercostal nerves. It is separated from the pleura with a strong fascia layer up to the second or third cartilage level. ITA goes anterior to the transversus thoracis muscle after 2nd level of costal cartilage. It divides into two branches musculophrenic and superior epigastric arteries in the sixth intercostal space.

In 1964, G.E. Green, MD, attempted to bypass the internal thoracic artery using an operation microscope to create anastomosis between the internal thoracic artery and the recipient coronary artery. In addition to the development of coronary cineangiography in the early 1960s allowed direct identification of stenotic and obstructive atherosclerotic lesions in the coronary arteries. Thus, a direct surgical approach to coronary artery disease begun.

After two decades, Loop et al. evaluated the operations for ten years in which internal thoracic artery was used as a grafted. An internal thoracic artery graft in the left anterior descending coronary artery resulted in more than 90% prolonged clearance without significant increase in morbidity and satisfactory blood flow to alleviate ischemia.

After these developments, the morphology of ITA has gained importance in terms of prevention of complications during surgery, and prolonging life after surgery. In this study, it is aimed to investigate relationship between sternum and internal thoracic artery.

MATERIALS AND METHODS

The measurements were made in 11 formaldehyde-fixed cadavers. Pleural dissection was performed in the cadavers whose anterior part of the thoracic cavity removed. The distance of the artery from the lateral and the median lines were measured from 2-5. intercostal space. To determine distance between ITA and paramedian line, the distance of the lateral edges of the sternum was measured at each intercostal space and the midpoint was marked. The distance between the midpoint of the artery and the point marked in the sternum was determined as the distance from paramedian line (dfl) (Fig.1). To determine length of the ITA, the distance between 2. intercostal space and bifurcatio point of the artery (where it gives the end branches) was measured. (Fig.2)
RESULTS

The right and left ITA length was 117.07 mm and 118.62 mm respectively. For the right ITA maximum: 135 mm minimum: 105.1 mm, the left ITA maximum 135.5 mm minimum: 101 mm was measured. Table 1 shows the distance measurements to the lateral edge of the sternum at each intercostal space. The distance between median line and bifurcation of the right ITA 31.06 mm and left ITA 32.32 mm. Minimum and maximum values for the right 21.6 mm and 42.45 mm; for the left 22.5 and 53.8 mm, respectively. Table 2 shows the measurements of the distance between the paramedian line and the artery at each intercostal space.

DISCUSSION

ITA is commonly used artery for coronary revascularization. When left anterior descending artery is anastomosed with ITA, survival rate has been found 10% for ten years. However, there are some disadvantages. As a result of pleurotomy, it can/could be seen several complications: parenchymal trauma, pleural effusion, atelectasis and pulmonary complication. Its is crucial to preservation of pleural integrity during dissection to reach ITA. Thus, it is supplied respiratory mechanisms and minimized lung injury.

When the last ten years studies were examined, it was found that the mortality rate was 20% lower when bilateral internal thoracic artery graft was compared with vena saphena and single internal thoracic artery graft.

Milani et al, studied difference between right and left ITA as a graft. 50 patients were divided into two groups and evaluated. Right ITA was used as a graft for the left anterior descending artery in half of them. The other half of the patients were operated by grafting the left ITA. After the operations, transit time flow was evaluated and compared. No significant difference was found between the two groups.

CONCLUSION

In the light of all these studies, the importance of internal thoracic artery on heart health and thus human life is undeniable. This study is unique in terms of the anatomical morphology of the thoracic internal artery.

REFERENCES